

CLAIMS

1. A method for removing at least a portion of a silicon dioxide layer from a substrate comprising:
 - (a) admixing a salt, a soluble cerium compound including Ce^{4+} ions; an oxidizing agent having a oxidation potential greater than Ce^{4+} , and de-ionized water to give a chemical mechanical polishing composition having a pH of from about 3.0 to about 11.0;
 - (b) applying the chemical mechanical polishing composition to the substrate; and
 - (c) removing at least a portion of the silicon oxide layer from the substrate by bringing a pad into contact with the substrate and moving the pad in relation to the substrate.
2. The method of claim 1, wherein the substrate is a layered substrate comprising at least one layer of silicon dioxide and at least one layer of silicon nitride.
3. The method of claim 1, wherein the silicon oxide is removed from the substrate at a rate at least five-fold greater than the removal rate of silicon nitride.
4. The method of claim 1, wherein the oxidizing agent is ammonium persulfate.
5. The method of claim 1, wherein the salt and soluble cerium compound is ammonium cerium nitrate.
6. The method of claim 1, including at least one metal oxide abrasive selected from the group including alumina, titania, zirconia, germania, silica, ceria and mixtures thereof.
7. The method of claim 1, wherein the metal oxide abrasive is silica.
8. A method for removing at least a portion of a silicon dioxide layer deposited on a silicon wafer including a silicon nitride layer comprising:
 - (a) mixing from about 2 to about 15 wt. % silica, from about 0.05 to about 10 wt. % ammonium cerium nitrate, from about 0.05 to about 5.0 wt. % ammonium persulfate, at least one chelating agent and de-ionized water to give a chemical mechanical polishing slurry having a pH of between about 3.8 to about 5.5;
 - (b) applying the chemical mechanical polishing slurry to a pad;
 - (c) rotating the pad; and

(d) removing at least a portion of the silicon dioxide layer by bringing the rotating pad into contact with the wafer and rotating the wafer in relation to the rotating pad.